Direct/Inverse Proportion

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Examples

Workout 1

Click here | Scan here — Direct Proportion

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Question 1: A is directly proportional to B.
When A = 12, B = 3
(a) Find a formula for A in terms of B.
(b) Find the value of A when B = 5
(c) Find the value of B when A = 36

Question 2: C is directly proportional to D.
When C = 125, D = 5
(a) Find an equation for C in terms of D.
(b) Find the value of C when D = 10
(c) Find the value of D when C = 75

Question 3: E is directly proportional to F.
When E = 2, F = 8
(a) Find an equation for E in terms of F.
(b) Find the value of E when F = 30
(c) Find the value of F when E = 100

Question 4: y is directly proportional to x.
When x = 400, y = 10
(a) Find a formula for y in terms of x.
(b) Calculate the value of y when x = 450
(c) Find the value of x when y = 200

Question 5: y is directly proportional to x.
Complete the table.

x	4	9	12
y			72

Question 6: y is directly proportional to x
Complete the table.

x	2.5	8	
y	4		50

Question 7: The cost, C pounds, of hiring a car is directly proportional to the number of days, d, it is hired.
When d = 5, C = 180

(a) Find the value of C when d = 3
(b) Find the value of d when C = 252

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Question 8: In a spring, the tension (T newtons) is directly proportional to the extension of the spring (y cm).
When the tension is 180 newtons, the extension is 4cm.

(a) Find a formula for T in terms of y.
(b) Work out the tension when the extension is 3cm
(c) Work out the extension, when the tension is 585 newtons.

Workout 2

Question 1: T is inversely proportional to N.
When T = 30, N = 5.
(a) Find an equation connecting T and N.
(b) Work out the value of T when N = 10
(c) Work out the value of N when T = 25

Question 2: *w* is inversely proportional to *f*
When *f* = 12, *w* = 40
(a) Find a formula connecting *w* and *f*
(b) Find the value of *w* when *f* = 60

Question 3: B is inversely proportional to y
When B = 0.8, y = 13
(a) Find an equation for B in terms of y.
(b) Work out the value of B when y = 5

Question 4: y is inversely proportional to x
Complete the table.

x	16	8	
y		10	20

Question 5: The number of days, D, to complete research is inversely proportional to the number of researchers, R, who are working.
The research takes 125 days to complete when 24 people work on it.
Find out how many people are needed to complete the research in 60 days.

Question 6: The volume, V litres, which a fixed mass of gas occupies is inversely proportional to its pressure, P pascals.

When the pressure is 200000 pascals, its volume is 6 litres.

(a) Find an equation connecting V and P.
(b) Find the volume of gas when the pressure is 150000
(c) Find the pressure when the volume of gas is 20 litres.

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Workout 3

Question 1: A is directly proportional to B^2
When A = 50, B = 5
(a) Find a formula for A in terms of B.
(b) Find the value of A when B = 3
(c) Find the value of B when A = 200

Question 2: y is directly proportional to the square of x
When y = 6.4, x = 4
(a) Find a formula for y in terms of x
(b) Find the value of y when x = 8
(c) Find the value of x when y = 78.4

Question 3: W is directly proportional to P^3.
When P = 2, W = 32
(a) Express W in terms of P
(b) What is the value of W when P = 4?
(c) What is the value of P when W = 4000?

Question 4: Z is directly proportion to $\sqrt{x}$
When Z = 12, x = 36
(a) Express Z in terms of x
(b) Work out the value of Z when x = 121
(c) Work out the value of x when Z = 18

Question 5: C is directly proportional to the cube of D
When D = 5, C = 175
(a) Work out the value of C when D = 6
(b) Work out the value of D when C = 4725

Question 6: y is directly proportional to the cube root of x
When y = 7600, x = 4096
(a) Find an equation connecting y and x.
(b) Calculate the value of y when x = 125
(c) Calculate the value of x when y = 9975

Question 7: The table shows a set of values for x and y.
y is directly proportional the the square root of x.

x	25	
y	9	36

Complete the table

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Question 8: An object when dropped, falls *d* metres in *t* seconds.
d is directly proportional to the square of *t.*
The object falls 80 metres in 4 seconds.
Work out how far the object falls in 9 seconds.

Question 9: The cost of a circular table is directly proportional to the square of its radius.
A table with a radius of 40cm cost £90.

What is the cost of a table with a radius of 60cm?

Question 10: The mass of a paperweight is *m* grams.
The length of the paperweight is *L* centimetres.
m is directly proportional to the cube of *L*.
$m = 4968$ when $L = 12$

(a) Work out an equation connecting *m* and *L*
(b) Work out the mass of a paperweight with a length of 4 centimetres

Workout 4

Question 1: y is inversely proportional to the square of x.
When y = 200, x = 2
(a) Find an equation connecting y and x.
(b) Work out the value of y when x = 5
(c) Work out the value of x when y = 50

Question 2: A is inversely proportional to the square of B.
When A = 2, B = 3
Find the value of A when B = 2

Question 3: W is inversely proportional to $\sqrt{B}$
When B = 9, W = 9
(a) Express W in terms of B
(b) Work out the value of W when B = 4
(c) Work out the value of B when W = 1

Question 4: T is inversely proportional to the cube of L
When L = 0.2, T = 5
(a) Write a formula connecting T and L.
(b) Work out the value of T when L = 0.5
(c) Work out the value of L when T = 2

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Question 5: q is inversely proportional to the square of t.
When q = 7.5, t = 1.6
(a) Calculate the value of q when t = 8
(b) Calculate the value of t when q = 1.875

Question 6: y is inversely proportional to the cube root of x
When y = 2500, x = 64
(a) Find the value of y when x = 8
(b) Find the value of x when y = 2000

Question 7: The table shows a set of values for x and y.
y is inversely proportional the the square of x.

x	1	2	3
y	7	$1\frac{3}{4}$	

(a) Find the equation for y in terms of x
(b) Find the missing value

Question 8: The force, *F* newtons, exerted by a magnet on a metal object is inversely proportional to the square of the distance *d* cm

When the *d* = 2cm, *F* = 60N

(a) Express *F* in terms of *d*
(b) Find the force when the distance between the magnet and the metal object is 10cm
(c) Find the distance between the magnet and the metal object when the force is 15N

Question 9: The time taken, *t*, for passengers to be checked-in for a flight is inversely proportional to the square of the number of staff, *s*, working

It takes 30 minutes for passengers to be checked-in when 5 staff are working.

(a) Find an equation connecting *t* and *s*.
(b) How long would it take to check-in the passengers with 3 staff working?

Apply

Question 1: C and D are positive numbers.
C is inversely proportional to D.
When C = 7, D = 28.
Find the value of C when C = D

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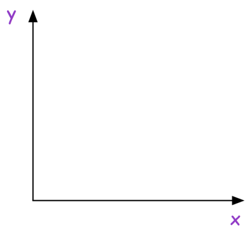
Question 2: The force, *F* newtons, exerted by a magnet on a metal object is inversely proportional to the square of the distance *d* cm
When d = 4cm, F = 300N.
Explain what happens to F, when d is halved.

Question 3: W is directly proportional to the cube of y.
Harry says that when y is halved, the value of W is divided by 10.

Explain why Harry is wrong.

Question 4: y is inversely proportional to x.
y and x are positive quantities.
When y = 200, x = 64

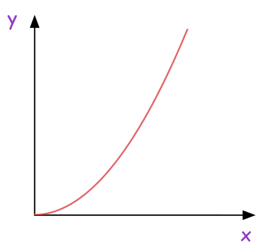
(a) Express y in terms of x
(b) Sketch a graph of the relationship between y and x



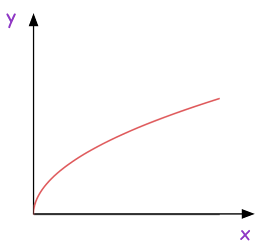
(c) Calculate the value of x, when y is twice as big as x.

Question 5: These graphs represent four different types of proportionality.
Match each type of proportionality to the correct graph.

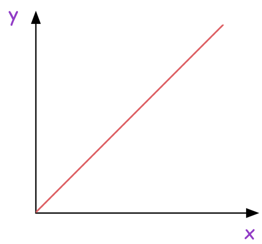
Graph 1



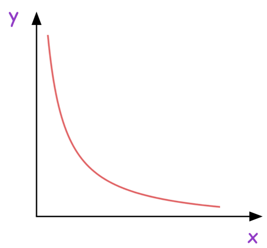
Graph 2



Graph 3



Graph 4



Graph	Type of Proportionality
	$y \propto x$
	$y \propto \sqrt{x}$
	$y \propto x^2$
	$y \propto \frac{1}{x}$

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Question 6: The time taken, *t*, for the waiters in a restaurant to serve food to the guest at a wedding is inversely proportional to the square of the number of waiters, *w*, working

It takes 90 minutes for the food to be served when 6 waiters are working.

What is the minimum number of waiters needed so that the time taken to serve the food is under 30 minutes?

Question 7: A is directly proportional to the cube root of B.
B is increased by 60%.
Work out the percentage increase in A.

Question 8: a is directly proportional to the cube of c.
w is inversely proportional the the square root of a

When c = 2, a = 48
When a = 9, w = 2400

Find the value of w when c = 6

Question 9: x is directly proportional to w^2
When w = 4, x = 48

y is inversely proportional to x^3
When x = 2, y = 14

Find a formula for y in terms of w.
Give your answer in its simplest form.

Answers

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